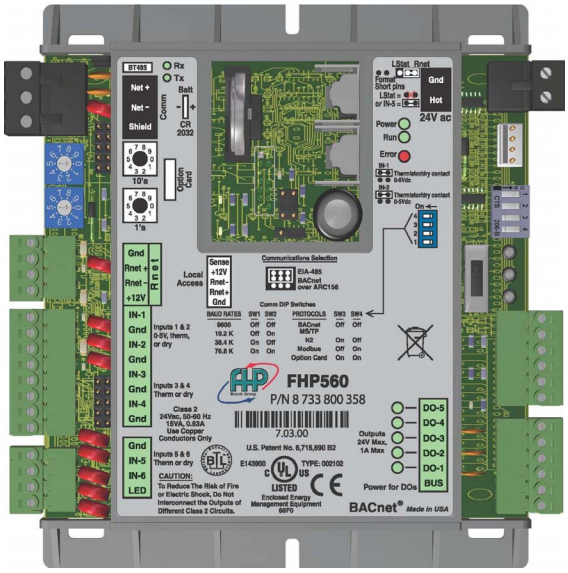
I/O ZONE 560/583

USERS GUIDE

641-224
641-242
641-237



Bosch Group

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The Zone Controller

The Zone control board also known as DDC and shown in figure 1 is used in most configure to order applications.

It is BACnet® native which makes it flexible and easy to integrate into existing Building Automation Systems (BAS). The main difference between the 560 and the I/O 583 is the Analog Output (AO) plug enclosed in figure 1.

The controller is programmed in the factory with software versions that suit the different applications FHP offers. User settings such as the time and test and balance set points shall be set up during the installation and commissioning process at the job site.

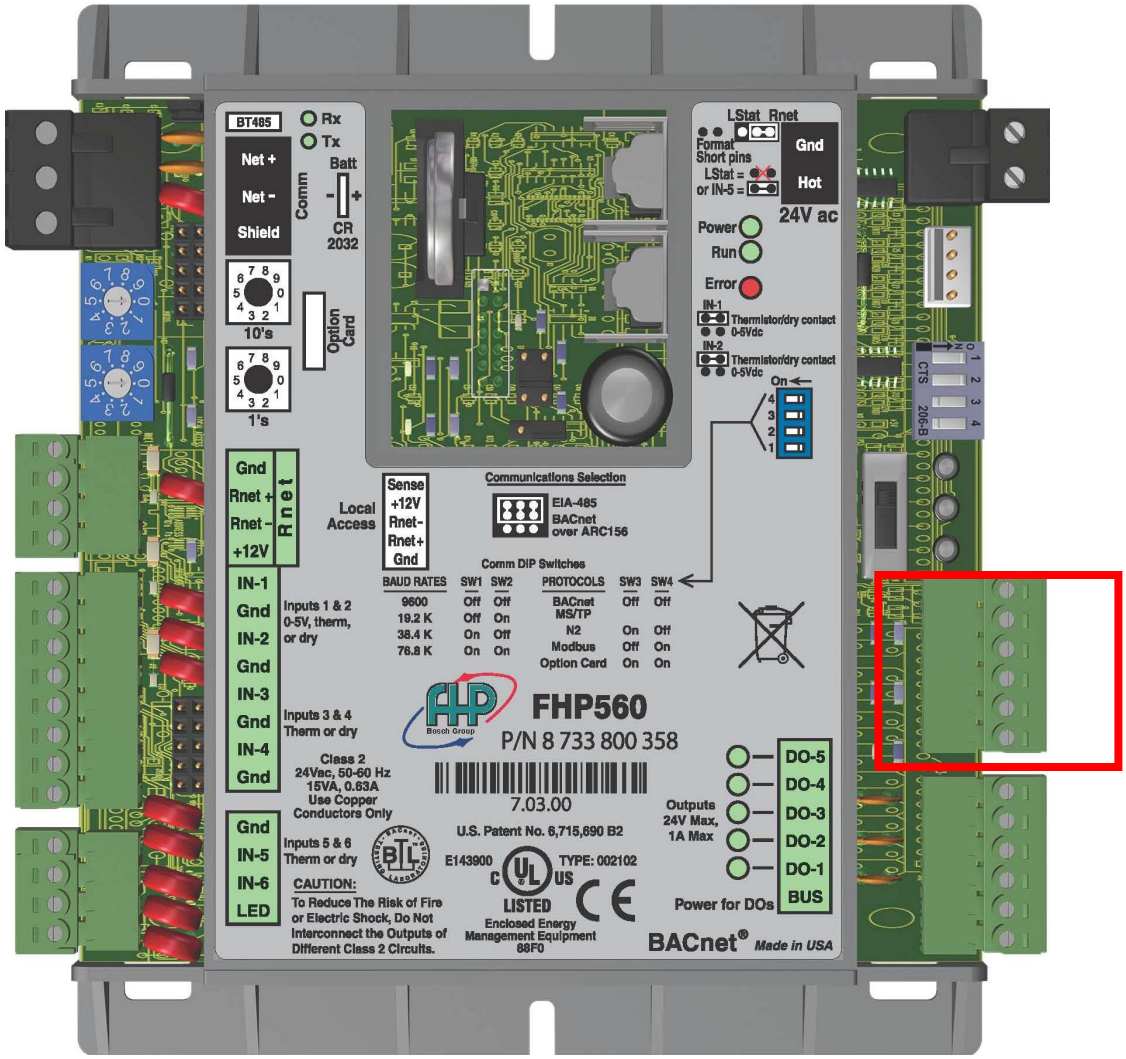


Figure 1 - Zone Controller

Analog plug enclosed in red box on figure above is only available on Zone I/O 583.

Specifications

Power:	24VAC ± 10%, 50-60Hz, 20VA power consumption (Single Class II 70VA or 100VA option available)
Physical:	Rugged plastic housing protects circuitry.
Environmental Operating Range:	40° to 130°F (-17.8° to 54.4°C); 10 to 90% relative humidity, non-condensing
Digital Outputs:	Five digital outputs relay contacts rated at 1A resistive @ 24VAC; configured as dry contact, normally open.
Universal Inputs:	8 inputs. Inputs 1 and 2 are configurable for 0-5VDC, 10K ohm thermistor, or dry contact; inputs 3 and 4 support thermistor or dry contact only; inputs 5 and 6 support thermistor, dry contact, or LogiStat. Inputs 7 and 8 are used for 1-10K adjustment pots or dry contacts.
Standard Communication Ports:	**Comm Port:** 3-pin port configurable for ARC156 (BACnet-over- ARC156) or EIA-485communications (BACnet MS/TP, Modbus RTU, orN2). **Rnet Port:** 4-pin port for interface with remote mounted BACview6 or RS sensors **Local Access Port:** For local communication with a laptop computer running WebCTRL or for communication with a BACview6.
Status Indication:	Visual (LED) status of network communication, running, errors, power, and all digital outputs
Battery:	Lithium 3V coin cell battery, CR2032, provides a minimum of 10,000 hours of Data retention during power outages
Protection:	Surge and transient protection circuitry for power and communications.
Listed by:	FCC Part 15 - Subpart B - Class A. Pending listings at the time of publishing this document: UL 916 (PAZX), cUL C22.2 No. 205-M1983 (PAZX7), CE (1997).
Weight:	0.6 lbs. (0.27 Kg).
Overall Dimensions:	5-1/16” (width) by 5-11/16” (height) by 1-1/2” (recommended panel depth). 129mm (width) by 144mm (height) by 38mm (recommended panel depth).
Mounting Hole Dimensions:	Two mounting holes center line as at left with 5-9/16” (141mm) Spacing (height)

Controller Components

LED Indicators

The DDC controller is equipped with three bank sets of LED that help the user diagnose problems and or identify normal operation.

The first bank is located in the upper left hand corner as shown in the figure 2. They flash repeatedly when the controller is communicating with the network and usually service support refers to them as Rx and Tx.

The second bank is located on the upper right hand corner of the controller as shown in figure 3. The first one from top to bottom is normally lit (on) while the controller is powered the second is the heart beat and will flash during normal operation, the third LED will remain off and will lit red in case there is an error in the controller.

In addition, when downloading new or modified versions of software these LEDs will flash on and off indicating new files are being written to its non-volatile memory.

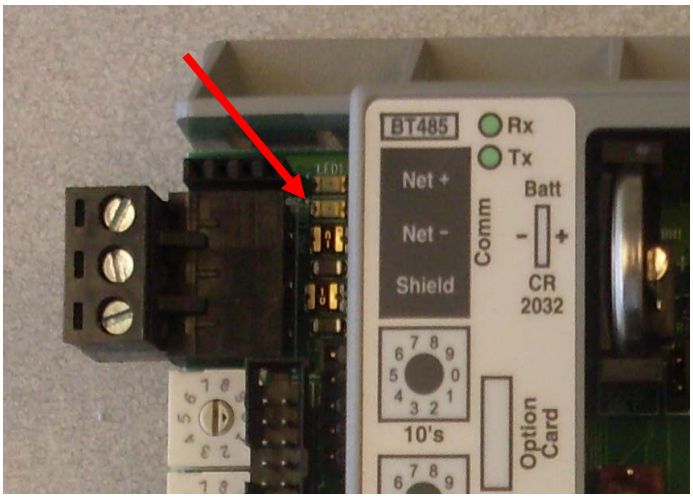


Figure 2 - Network LEDs

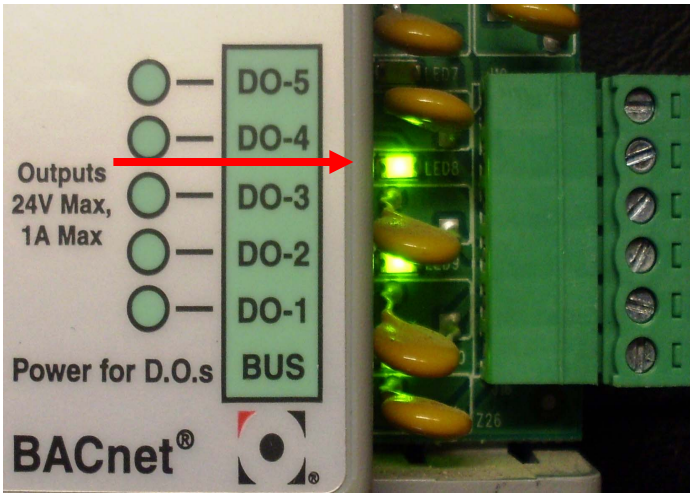


Figure 3 - Power LEDs

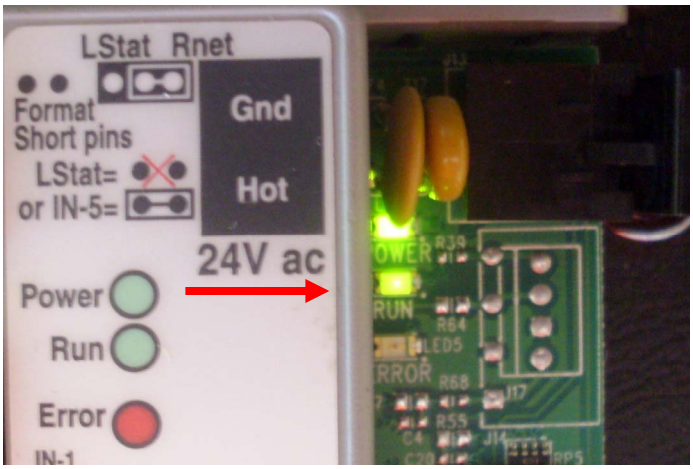


Figure 4 – Digital Output LEDs

The Third Bank of LEDs are located on the bottom right corner of the controller as shown on figure 4 (right) and their purpose is to show the status of individual Digital Outputs (DO) as they are energized

DIP and Rotary Switches

Two sets of switches can be found on the controllers, they must be set properly to allow correct operation of the unit.

The first set are rotary switches, as shown in figure 5, is located on the left hand corner near the top and their function is to provide the controller address it always convenient to identify the rotary for the tens and the rotary for the ones as shown in figure 6.

The second set is located on the top left hand corner of the controller and it is used for two purposes:

(1) SW1 and SW2 set the baud rate of the communications port on the controller:

BAUD RATE	SW1	SW2
9600	Off	Off
19.2K	Off	On
38.4K	On	Off
76.8K	On	On

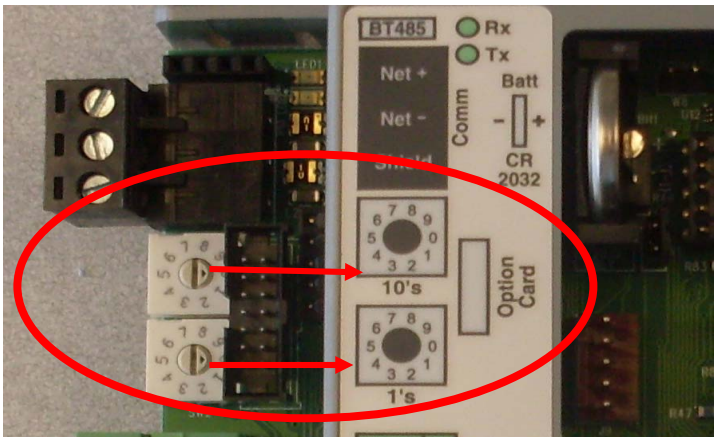
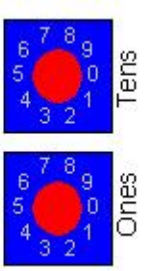


Figure 5 – Controller Address Rotary DIP switch



IMPORTANT:
Controllers must be addressed correctly for multiple units to work on a network.

Figure 6 – Rotary switches

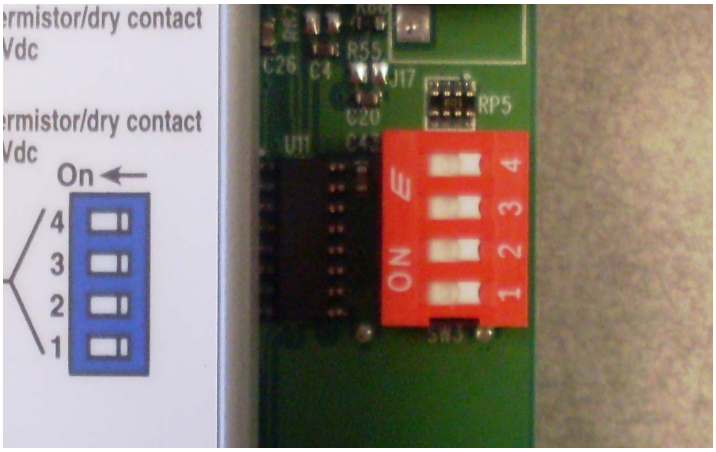


Figure 7 – DIP Switches

(2) SW3 and SW4 enable different supported protocols on the controller additional hardware is needed for LonTalk®.

PROTOCOLS	SW3	SW4
BACnet® MS/TP	Off	Off
N2	On	Off
Modbus	Off	On
Option Card	On	On

Typical DIP switch for LonTalk® (Option Card) is shown in figure 8.

Figure 8 - LonTalk® DIP Settings

Jumpers and settings

Controllers come equipped with a series of jumpers which allow different types of inputs to be terminated in a particular point.

Most inputs allow thermistor or dry contact input devices to be terminated in them, however IN1 and IN2 can be used as analog or digital input points and their available options are as follows:

- 0-5 VDC Analog Input
- Thermistor
- Dry Contact

FHP sets most switches in the factory, however there are certain cases where a particular sensor is required by the customer, therefore it is important for the installer to understand jumper settings and their relationship with unit configuration and operation. Figure 9 shows the location of the jumpers on the controller.

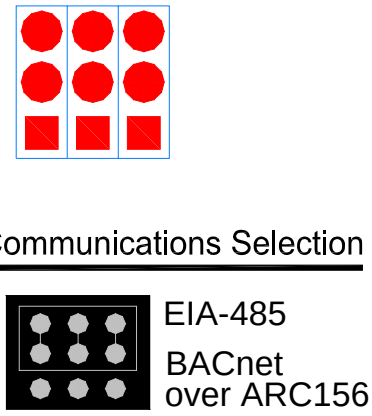


Figure 9 - Jumper setting for LonTalk® only.

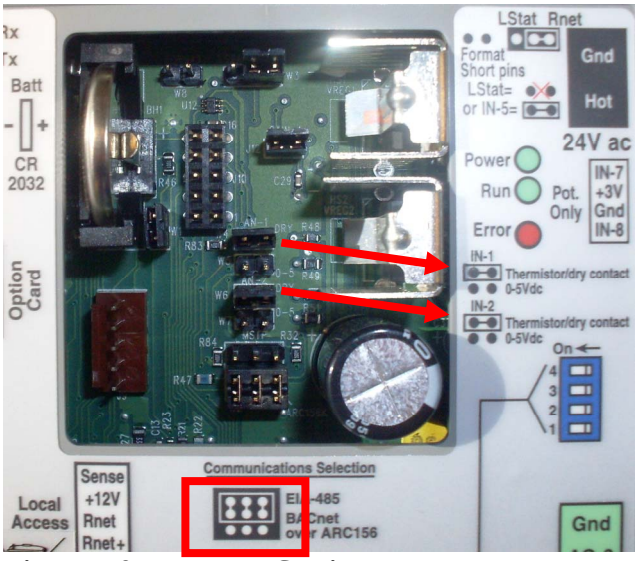


Figure 10 - Jumper Settings

LonWorks® card option

LonWorks® is a network platform that allows any facility or to integrate sub-systems using a common system architecture and infrastructure.

This platform provides fully open operability of the components within a system or sub-system, this enables the facility owner to utilize different vendors and still have the capability of integrating their system into one single server or front end.

The LON card option is available for both controllers 641-224 and 641-242.

The Lon card connects to the option card port as shown in figure 11.

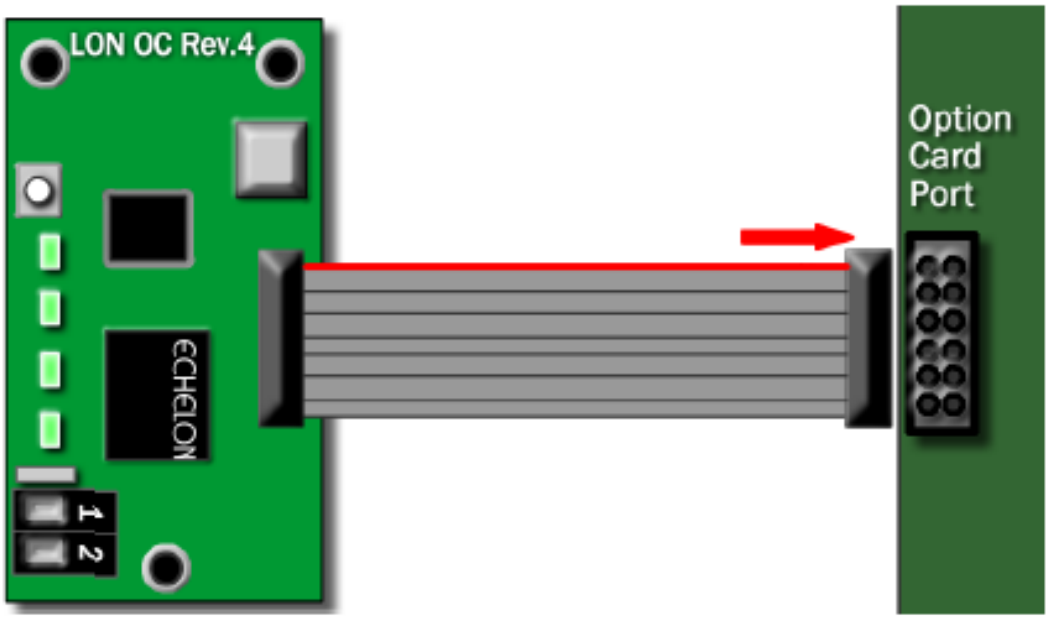


Figure 11 - LonTalk® Card – 641-237

Water to Air Operation

General Description

The Heat Pump Factory mounted I/O Zone 560 or 583 DDC Controllers are factory configured with the Water to Air application program and factory installed in the unit to be job site configureable to run.

The unit will operate in a 100% stand-alone control mode or connect to a Building Automation System (BAS) using open protocols BACnet® (ARCNET and MS/TP), Modbus RTU, N2 or LonWorks® (additional network interface board required for LonWorks® option).

The point mapping to all of these protocols is available in www.fhp-mfg.com and can be pre-set, so that the protocol and baud rates desired can be easily field-selected and commissioned without the need for any additional downloads or technical assistance.

The DDC Controller also supports communications to intelligent RS Room sensors and BACview keypad/display panels.

Key Features and Benefits

- I/O point count: 5 Digital outputs and 6 Universal inputs
- Powerful high speed microprocessor with 1MB Flash memory and 1MB of battery-backed RAM
- Built-in protocol support: BACnet® (ARCNET and MS/TP), Modbus, N2 and LonWorks® (additional network interface board required for LonWorks® option)
- Built-in local access support: BACview6 keyboard/display and Intelligent RS Room sensors
- On-board lithium battery holds Controller time clock settings
- Program archived in non-volatile memory allows unit to be ready after long periods of power outages.

Inputs

- RS Room temperature sensor (Rnet)
- RS Room temperature sensor Set point adjust (Rnet)
- RS Room temperature sensor Occupancy override (Rnet)
- Discharge air temperature sensor
- Leaving water temperature sensor
- Unit Protection module (UPM) Alarm codes (7 safety shutdown alarms)
- Unit Filter status (optional)
- Unit Enable manual control (optional DI Enable)

Outputs

- Unit blower control
- Reversing Valve
- Cooling Stage 1
- Cooling Stage 2 (Comp 2 Circuit or Comp1 Stage 2)
- Humidity control output (optional Hot gas re-heat)
- Auxiliary/Emergency Heating Stage (optional Electric Heat)

Control & Status Parameters and Alarms

Control

- BACview occupancy schedule
- System control: Schedule, Manual ON, BAS command or DI Enable
- Room temperature occupied cooling/heating set point
- Room temperature unoccupied cooling/heating set point
- Unit blower control
- Reversing valve control
- Compressor 1 control
- Compressor 2 control (Comp 2 Circuit)
- Unit Enable manual control (optional)
- Humidity Control (hot gas re-heat optional)
- Auxiliary/Emergency Electric heat output control (optional)

Status

- Cooling/Heating control status
- Cooling/Heating percentage (0-100%)
- Room temperature
- Discharge air temperature
- Leaving water temperature
- Changeover temperature
- Unit filter status (optional)
- Fan-Hours runtime counter (filter replacement indicator)
- Fan starts counter
- Comp 1 starts counter
- Comp 2 starts counter (Comp 2 Circuit)

Alarms

- Room temperature high/low differential
- Leaving water temperature high/low trip
- Discharge air temperature high/low trip
- Sensor failure alarm
- Unit filter Runtime trip (optional)
- Comp 1 Runtime trip
- Comp 2 Runtime trip (Comp 2 Circuit)
- Freeze Stat sensor UPM alarm (optional)
- Low pressure sensor UPM alarm
- High pressure sensor UPM alarm
- Low pressure sensor UPM alarm (Comp 2 Circuit)
- High pressure sensor UPM alarm (Comp 2 Circuit)
- Condensate overflow UPM alarm
- High/low voltage UPM alarm

Sequence of Operation

Run Conditions:

The unit will run according to a user definable time schedule, dry contact (physical digital input number 1), manual ON command from BACview control interface, timed local override from Zone temperature sensor or via third party front end start command (software point). When commanded to run the unit will operate in the following modes:

Occupied Mode: The unit will maintain

- A 74°F (adj.) Cooling setpoint
- A 70°F (adj.) Heating setpoint

Unoccupied Mode (night setback): The unit will maintain

- A 90°F (adj.) Cooling setpoint.
- A 55°F (adj.) Heating setpoint.

The unit will operate and adjust the setpoints according to the heating and cooling limits which can be changed by the technical agent during the commissioning process if needed. The factory default limits are the following:

Occupied Limits:	Unoccupied Limits:
75 °F Heating High	70 °F Heating High
60 °F heating Low	50 °F Heating Low
85 °F Cooling High	95 °F Cooling High
65 °F Cooling Low	80 °F Cooling Low

IMPORTANT: It is important not to overlap these limits on their respective modes (occupied and unoccupied), overlapping may result in unit cycling between heating and cooling.

Zone Temperature

The occupant will be able to see the zone temperature on the sensor LCD display in addition the user will be able to see other parameters that have been configured in the controller such as alarm status, alarm codes, Inputs and outputs status among others.

NOTE: These codes and values vary from version to version for additional information on what is available on the RS-Pro sensor please check its commissioning BACview manual in our web site www.fhp-mfg.com.

Alarms will be provided as follows:

High Zone Temp: If the zone temperature is greater than the cooling setpoint plus a user definable amount (adj.), the factory default for this amount is 10.
Low Zone Temp: If the zone temperature is less than the heating setpoint minus a user definable amount (adj.) the factory default for this amount is 10.

Zone Sensor Failure: If Zone sensor outside of normal operating limits, typically produced by a wire failure between the sensor and the controller.

Zone Setpoint Adjust:

The occupant will be able to adjust the zone temperature heating and cooling setpoints at the zone sensor (when RS Plus or RS Pro sensors are used). Zone sensor adjustment will allow for +/-5°F of adjustment. If RS Standard sensor is used, then setpoint adjustments must be done at the BACview keyboard/display or through BAS third party control.

Zone Unoccupied Override:

A timed local override control will allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time (presets at 1-2-4 or 6 hours). At the expiration of this time, control of the unit will automatically return to the software schedule or third party control.

Freeze Protection:

The unit shall shut down and generate an alarm upon receiving a freezestat status.

Fan:

Constant Volume

In the occupied mode, the fan shall run continuously or cycle with the compressor(s) depending on fan mode settings. In the unoccupied mode, fan cycles as required for unoccupied heating and cooling setpoints while in night setback.

Variable Frequency Drive

On units equipped with a factory or field installed Variable Frequency Drive (VFD) the controller will command the VFD signal to maintain a particular (User Definable) value of Static pressure, this is typical on VAV applications with discharge air control requirements.

Zone Humidity:

If specified the controller has the capability to monitor and control the zone humidity via the hot gas re-heat option.
There are two hardware options for humidity control:

Hot Gas Re-Heat Valve On/Off: This valve is controlled based on a 60% relative humidity setpoint (User Definable) and will only be energized once the temperature set points are satisfied, this valve is a two position valve and therefore is an on/off operation.

Alarms will be provided as follows:

- High Zone Humidity: If the zone humidity is greater than 75% (adj.).
- Low Zone Humidity: If the zone humidity is less than 35% (adj.).

The controller prioritizes the sensible load and therefore if temperature rises or decreases during the re-heat operation the controller will switch to heating or cooling operation.

Modulating Re-Heat Valve:

This valve is an analog device and has the capability to modulate the amount of hot gas that is allowed through the re-heat coil, thus allowing control of the discharge air temperature to a user defined setpoint.

The operation is similar to the on/off control except once the space temperature is satisfied the controller will monitor the space humidity if the value is greater than the setpoint the controller will modulate the valve to meet a particular a desired discharge air temperature on zone applications only.

A typical application of modulating re heat valves can be seen on Discharge Air Control systems where the unit is required to maintain a particular value of supply air temperature (neutral air).
For this particular type of units the unit will only discharge air to meet the specific setpoint, this operation is done via a reverse acting PID closed loop, and its sequence of operation is described in detail under the Discharge air section of this document.

Filter:

Based on fan runtime, a filter alarm message is generated after a user definable amount (adj. factory default 2000 hours) or can be enabled by an optional differential pressure switch.

Heating and Cooling – (1 and 2 Compressor Stages):

The controller will measure the zone temperature and stage the compressor(s) to maintain its setpoint. To prevent short cycling, there will be a 5 minute delay between compressor stages (if equipped with 2 compressors). Additionally, there will be a 1 minute delay when transitioning between heat and cool modes. The compressor will run subject to internal safeties and controls provided by UPM board.

The heating will be enabled whenever:

- The fan output is on.
- AND the reversing valve is in heat mode (de-energized).

The cooling will be enabled whenever:

- The fan output is on.
- AND the reversing valve is in cool mode (energized).
-

Reversing valve:

The reversing valve is energized on a call for cooling and will remain energized until a call for heating. Upon a call for heating, the reversing valve is de-energized and remains de-energized until a call for cooling or a call for re-heat on units with humidity (on/off) control option. The compressor will be disabled and remain off for 10sec after the reversing valve has changed position.

Alarms will be provided as follows:

Compressor 1 Runtime Exceeded: Compressor 1 runtime exceeds a user definable limit (adj.).
Compressor 2 Runtime Exceeded: Compressor 2 runtime exceeds a user definable limit (adj.).

Supplemental Electric Heating Stage:

The controller will measure the zone temperature and stage the heating to maintain its heating setpoint should the compressors not meet the heating demand. To prevent short cycling, the stage will have a 5 minute delay allowing compressor stages to meet the needs of the space.
The heating will be enabled whenever:

- The heat pump is in heating mode.
- AND the zone temperature is below heating setpoint.
- AND the fan is on.

The controller will only allow supplemental heating if the unit is configured to allow this operation, units equipped with hot gas re heat valves or damper control enable will not have supplemental electric heat functionality.

Discharge Air Temperature:

The controller will monitor the discharge air temperature to be located at discharge side of coil. If the supplemental heating is installed then sensor will be in the discharge side of heating coil.
Alarms will be provided as follows:
High Discharge Air Temp: If unit running in cool mode and the discharge air temperature is greater than 70°F (adj.).
Low Discharge Air Temp: If unit running in heat mode and the discharge air temperature is less than 75°F (adj.).
Discharge Air Sensor Failure: If discharge air sensor outside of normal operating limits.

Discharge Air Control

On units with factory mounted modulating re-heat valves the controller will operate the unit to maintain a particular discharge temperature setpoint. The discharge air temperature sensor (DATS) will be located at discharge side of coil preferable 3/4 downstream of the total length of the duct work.
The controller can operate on single or Multiple Outside Air Temperature Reset, the controller will monitor the value of the Outside Air temperature via a BACnet point or via a physical point terminated in one of the controllers available inputs. The controller will stage the unit's compressors and modulate the re-heat valve mode to maintain the Discharge Air Setpoint (User adjustable).

Two modes are selectable for Discharge Air Control (DAC) Applications are as follows:

- Single Outside Air Temperature Reset point
- Multiple Outside Air Temperature Reset points

Single Outside Air Temperature (OAT) Reset:

OAT> OAT Reset °F (adj.):

Controller will initiate cooling call to run compressors and modulate Re-heat Valve only when the outside air temperature is greater than 55°F (Factory Default)

OAT< OAT Reset °F (adj.):

Controller will initiate a call for heating. Straight cool units will run their fan continuously or if the unit is equipped with a Variable Frequency Drive (VFD) it will command the drive to maintain its static pressure setpoint.

Multiple Outside Air Temperature (OAT) Reset:

OAT Reset °F < OAT< OAT Reset 2 °F (adj.):

Controller will command the unit to run free-cooling operation the fan will run continuously or if the unit is equipped with a Variable Frequency Drive (VFD) it will command the drive to maintain its static pressure setpoint.

OAT Reset 2 °F < OAT< OAT Reset 3 °F (adj.):

Controller will command the unit to run single stage of cooling operation, the valve will be set for cooling operation and the first compressor will be commanded on, the fan will run continuously or if the unit is equipped with a Variable Frequency Drive (VFD) it will command the drive to maintain its static pressure setpoint and the re-heat valve will be modulated to maintain a 65°F (Factory Default (adj.)) discharge air temperature setpoint .

OAT > OAT Reset 3 °F (adj.):

Controller will command the unit to run full mechanical cooling operation (on units with more than two compressors please check with factory), the valve will be set for cooling operation and both first and second compressors will be commanded on, the fan will run continuously or if the unit is equipped with a Variable Frequency Drive (VFD) it will command the drive to maintain its static pressure setpoint and the re-heat valve will be modulated to maintain a 65°F (Factory Default (adj.)) discharge air temperature setpoint .

Leaving Water Temperature:

The controller will monitor the leaving water temperature.

Alarms will be provided as follows:

High Leaving Water Temp: If compressor(s) is running and the leaving water temperature is greater than 135°F (adj.).

Low Leaving Water Temp: If compressor(s) is running and the leaving water temperature is less than 35°F (adj.).

Leaving Water Sensor Failure: If leaving water sensor outside of normal operating limits.

Should a High or Low Leaving Water Temperature Alarm occur, the call for heat or cool will be removed.

UPM Fault Monitor:

The controller will monitor the Unit protection Module (UPM) fault input.

Upon hard lock out alarm, compressors are disabled by FHP UPM board.

Alarms will be provided as follows:

HP1: High Pressure Alarm (circuit 1)

HP2: High Pressure Alarm (circuit 2)

LP1: Low Pressure Alarm (circuit 1)

LP2: Low Pressure Alarm (circuit 2)

FRE: Freeze Alarm

CON: Condensate Alarm

BRN: Brownout Alarm

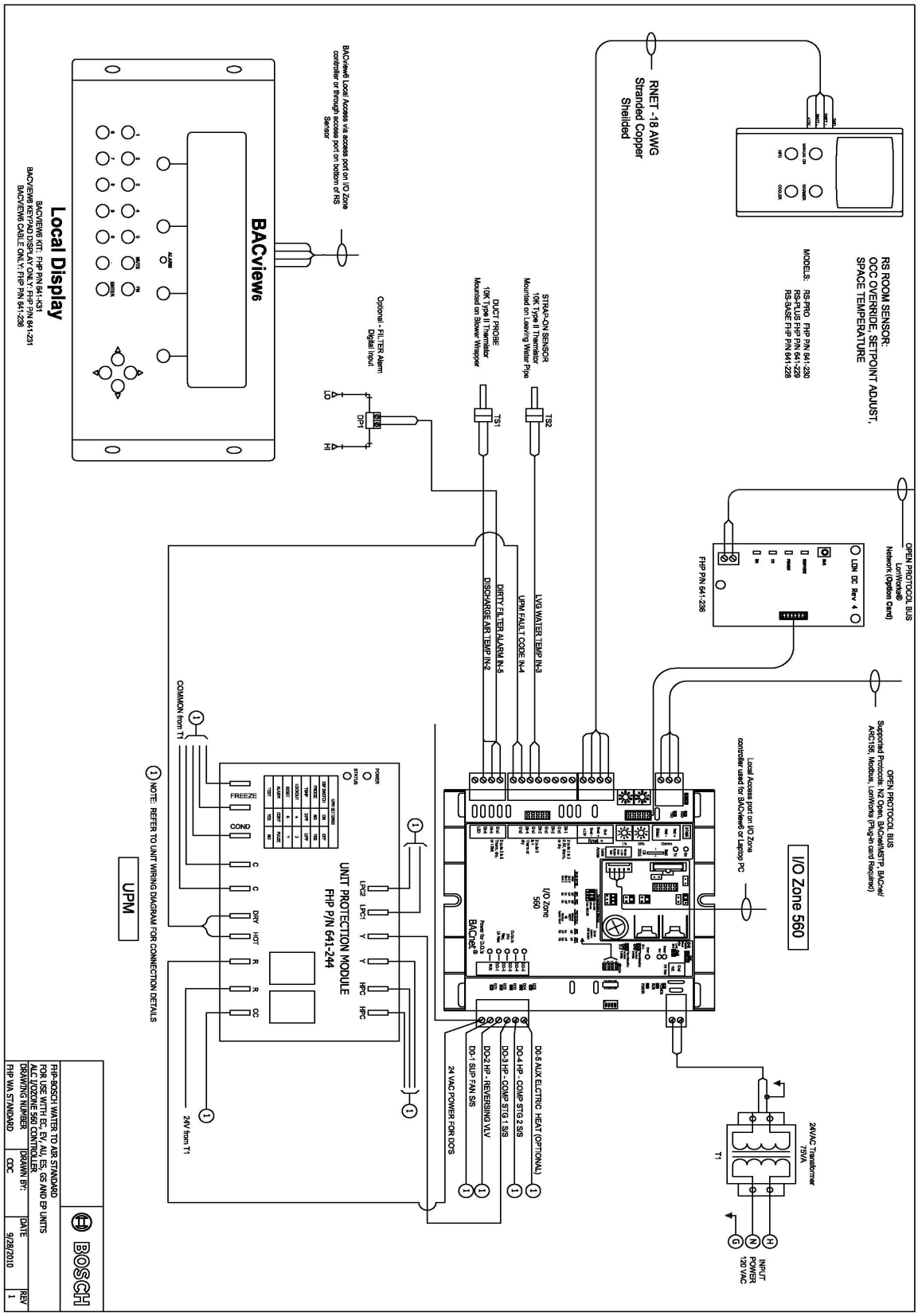


Figure 12 - Typical water to air applications – Water to Air Standard

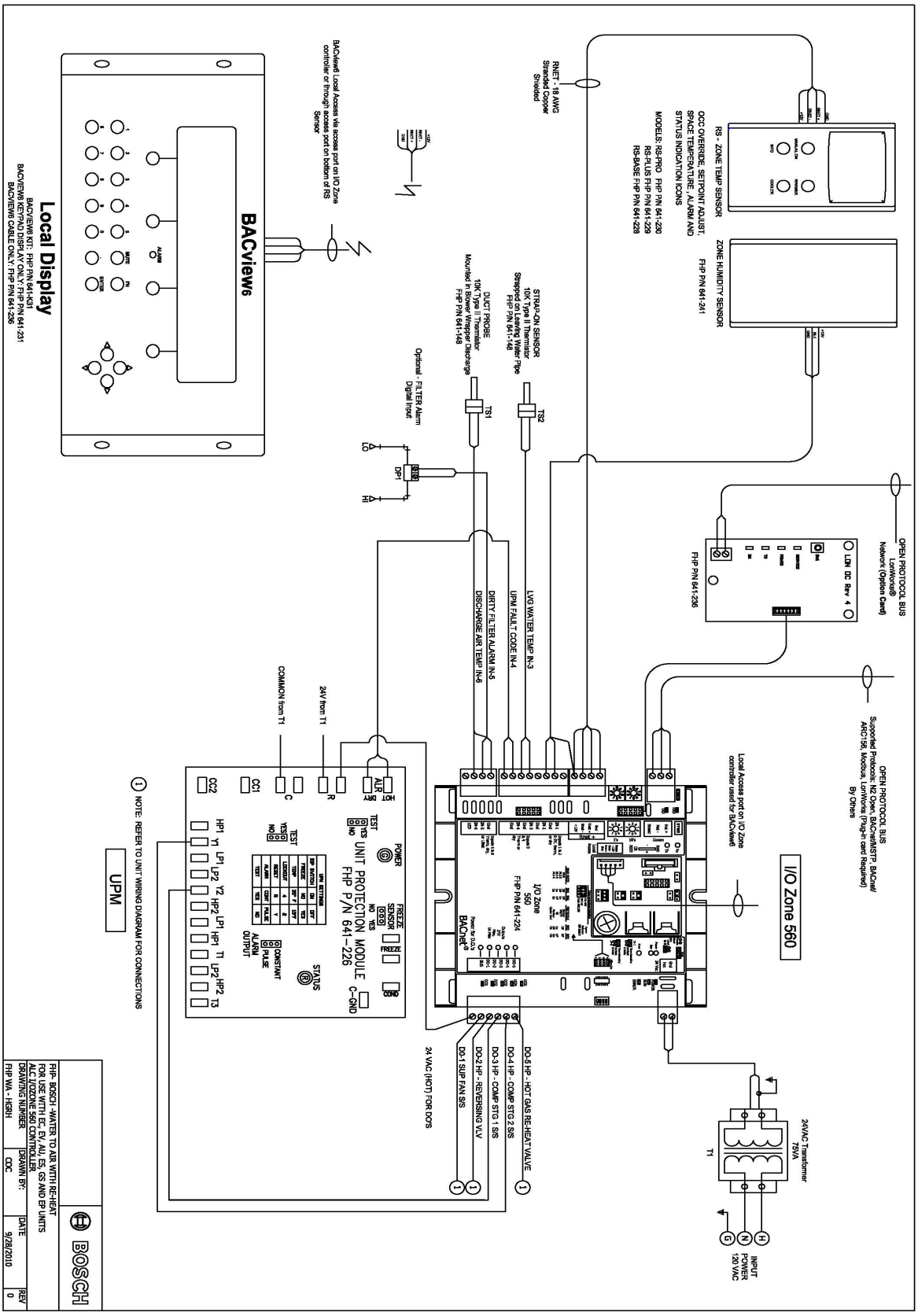

Local Display
BACview6 KIT: FHP P/N 641-KS1
BACVIEW6 KEYPAD DISPLAY ONLY: FHP P/N 641-231
BACVIEW6 CABLE ONLY : FHP P/N 641-236
BACview6
BACview6 Local Access via access port on I/O Zone controller or through access port on bottom of RS Sensor
RS - ZONE TEMP SENSOR
OCC OVERRIDE, SETPOINT ADJUST, SPACE TEMPERATURE, ALARM AND STATUS INDICATION ICONS
MODELS: RS-PRO FHP P/N 641-230
RS-PLUS FHP P/N 641-229
RS-BASE FHP P/N 641-228
ZONE HUMIDITY SENSOR
FHP P/N 641-241
RNET - 18 AWG Stranded Copper Shielded
STRAP-ON SENSOR 10K Type II Thermistor Strapped on Leaving Water Pipe FHP P/N 641-148
DUCT PROBE 10K Type II Thermistor Mounted in Blower Wrapper Discharge FHP P/N 641-148
Optional - FILTER Alarm Digital Input
TS1
TS2
DP1
LO
HI
OPEN PROTOCOL BUS LonWorks® Network (Option Card)
LON DC Rev 4
FHP P/N 641-236
OPEN PROTOCOL BUS Supported Protocols: LONWorks (BACnet/MSTP, BACnet/IP, ARC156, Modbus, N2 Open (Plug-in card Required) By Others
Local Access port on I/O Zone controller mixed for BACviews
I/O Zone 560
I/O Zone 560 FHP P/N 641-224
DIRTY FILTER ALARM IN-5
DISCHARGE AIR TEMP IN-6
LVG WATER TEMP IN-3
UPM FAULT CODE IN-4
24V from T1
COMMON from T1
UNIT PROTECTION MODULE FHP P/N 641-226 C-GND
POWER
TEST
FREEZE SENSOR
STATUS
CONSTANT ALARM OUTPUT
HOT ALRT
R
C
CC1
CC2
HP1 Y1 LP1 LP2 Y2 HP2 LP1 HP1 T1 LP2 HP2 T3
NOTE: REFER TO UNIT WIRING DIAGRAM FOR CONNECTIONS
UPM
24 VAC (HOT) FOR DO'S
DO-5 HP - HOT GAS RE-HEAT VALVE
DO-4 HP - COMP STG 2 SS
DO-3 HP - COMP STG 1 SS
DO-2 HP - REVERSING VLV
DO-1 SUP FAN S/S
24VAC Transformer 75VA
T1
INPUT POWER 120 VAC
FHP- BOSCH -WATER TO AIR WITH RE-HEAT
FOR USE WITH EC, EV, AU, ES, GS AND EP UNITS
ALC I/OZONE 560 CONTROLLER
DRAWING NUMBER
FHP WA - HGRH
DRAWN BY:
CDC
DATE
9/28/2010
REV
0
BOSCH

Figure 13 -Typical water to air applications – Water to Air with Hot Gas Re-Heat

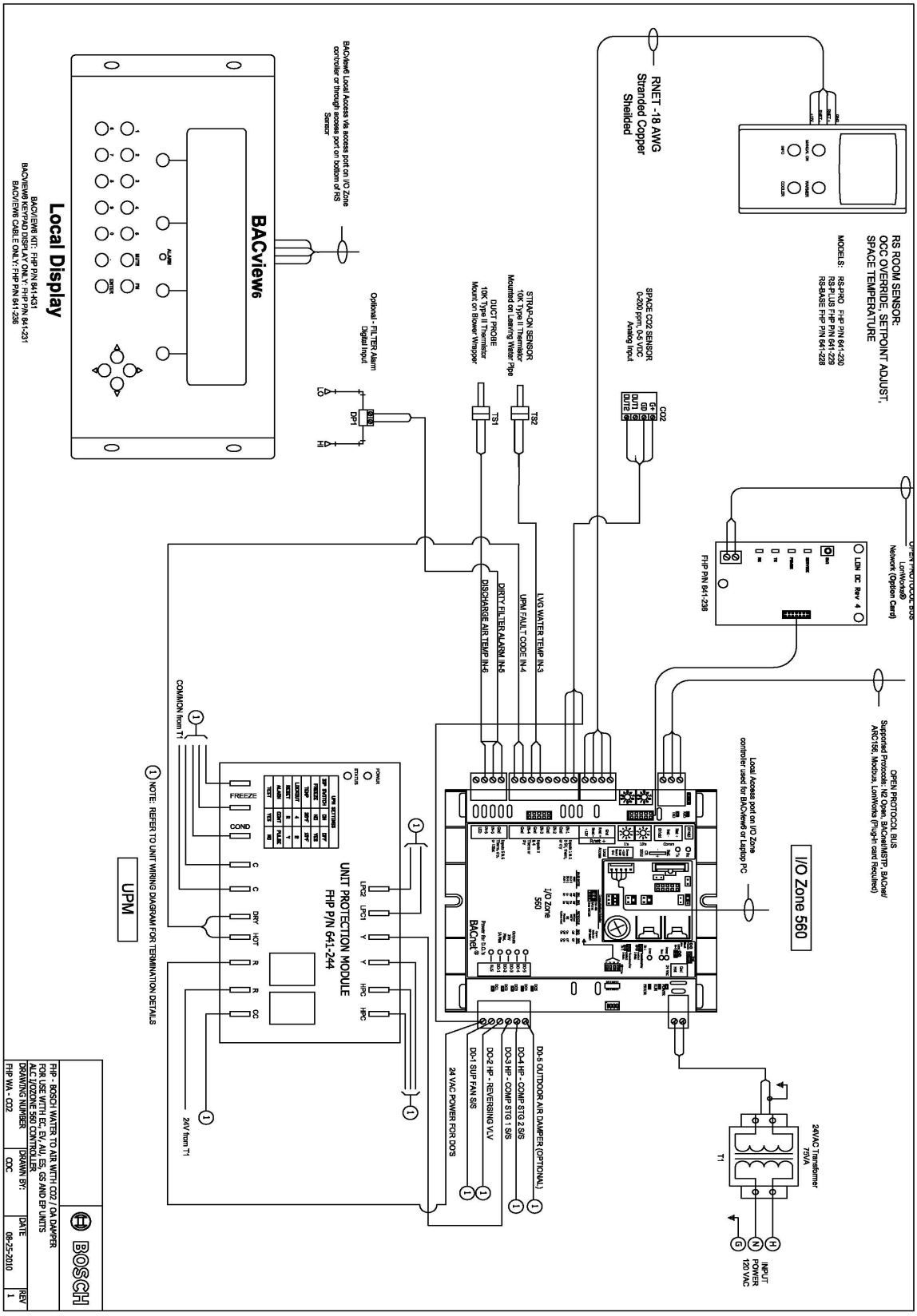


Figure 14 - Typical water to air applications – Water to Air with CO2 and OA Damper

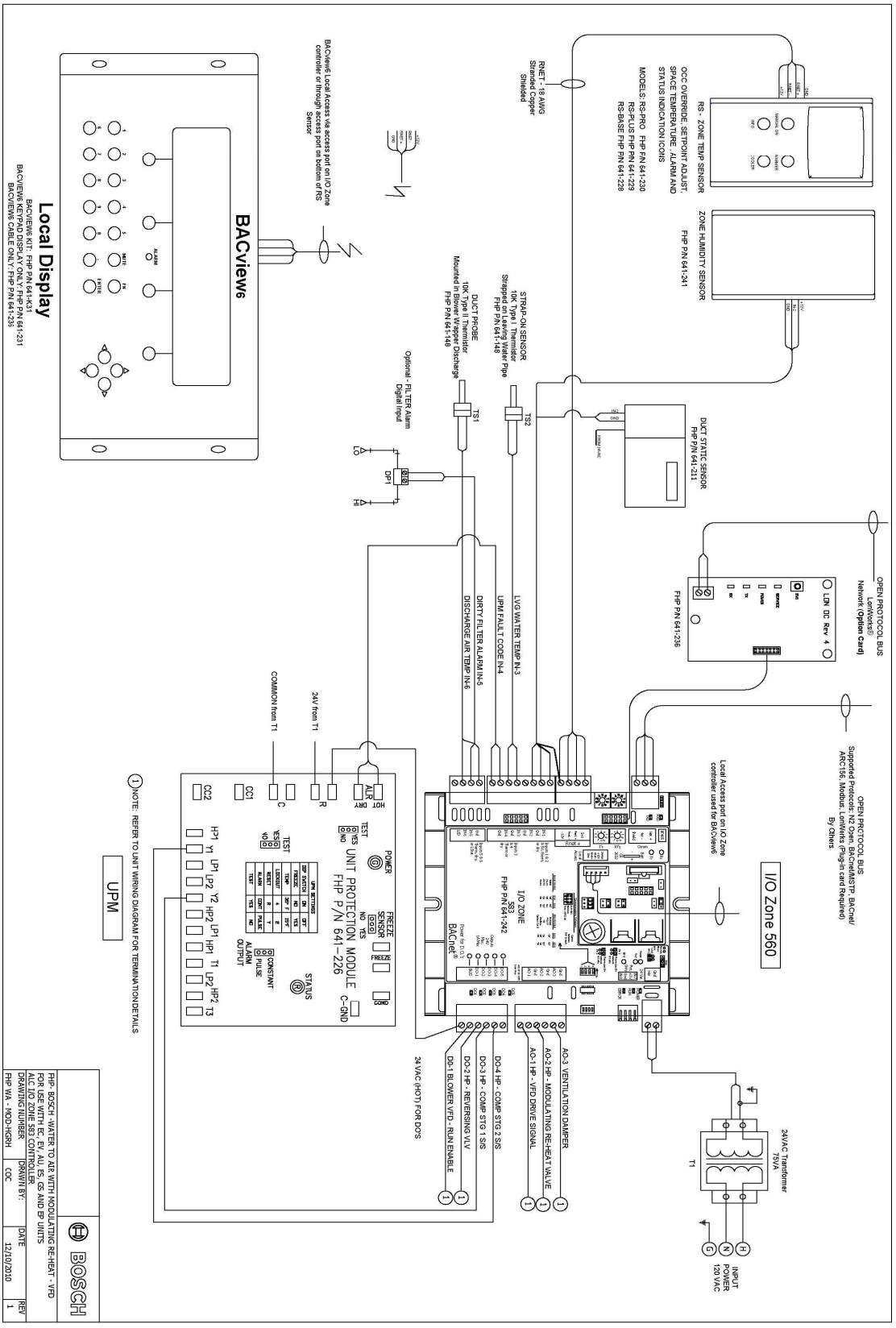


Figure 15 – Typical water to air application – Discharge Air Control with Modulating Reheat Valves

Point Name	BACnet		Modbus		N2 Open		LonWorks		Read Only	Description
	Name	Type:ID	Object Type	Register	Type	Object ID	Name	SNVT		
BV Unit Enable (BAS)	enable_bas_1	BV:1	discrete out	1	binary out	1	nviEnaBas	SNVT_Count_inc 9		Network parameter to define occupancy
Unocc Htg Setpoint	unocc_htg_stpt_1	AV:1	float value	40037	data float	19	nviUnoccHtgStpt	SNVT_temp_p 105		Network parameter to define unoccupied heating setpoint
Occ Htg Setpoint	occ_htg_stpt_1	AV:2	float value	40027	data float	14	nviOccHtgStpt	SNVT_temp_p 105		Network parameter to define occupied heating setpoint
Unocc Clg Setpoint	unocc_clg_stpt_1	AV:3	float value	40035	data float	18	nviUnoccClgStpt	SNVT_temp_p 105		Network parameter to define unoccupied cooling setpoint
Occ Clg Setpoint	occ_clg_stpt_1	AV:4	float value	40025	data float	13	nviOccClgSpt	SNVT_temp_p 105		Network parameter to define occupied cooling setpoint
Effect Cooling Setpoint	eff_clg_stpt_1	AV:5	float value	40013	data float	7	nvoEffClgStpt	SNVT_temp_p 105	✓	Network status of effective cooling setpoint (after setpoint adjustment applied)
Effect Heating Setpoint	eff_htg_stpt_1	AV:6	float value	40017	data float	9	nvoEffHtgSpt	SNVT_temp_p 105	✓	Network status of effective heating setpoint (after setpoint adjustment applied)
Effect Zone Temp	eff_zone_temp_1	AV:7	float value	40021	data float	11	nvoEffZnTmp	SNVT_temp_p 105	✓	Network status of zone temperature
Setpoint Adjust	stpt_adj_1	AV:8	float value	40031	data float	16	nvoStptAdj	SNVT_temp_p 105	✓	Network status of setpoint adjustment (from sensor in space)
Override Time	ovr_time_1	AV:9	float value	40029	data float	15	nvoOvrTime	SNVT_Count 8	✓	Network status of override time remaining (from sensor in space)
Effect Disch Air Temp	eff_dat_1	AV:10	float value	40015	data float	8	nvoEffDat	SNVT_temp_p 105	✓	Network status of discharge air temperature
Effect Leaving Wtr Temp	eff_lwt_1	AV:11	float value	40019	data float	10	nvoEffLwt	SNVT_temp_p 105	✓	Network status of leaving water temperature
Heating Percent	htg_pct_1	AV:12	float value	40023	data float	12	nvoHtgPct	SNVT_lev_cont 21	✓	Network status indicating percent capacity of heating
Cooling Percent	clg_pct_1	AV:13	float value	40007	data float	4	nvoClgPct	SNVT_lev_cont 21	✓	Network status indicating percent capacity of cooling
LP1	lp1_2st_1	BV:4	discrete in	10022	binary in	22	nvoLp1Alm	SNVT_Count_inc 9	✓	Network status of UPM Low Pressure Alarm Comp 1(0=LP1 normal, 1=LP1 alarm)
HP1	hp1_2st_1	BV:5	discrete in	10019	binary in	19	nvoHp1Alm	SNVT_Count_inc 9	✓	Network status of UPM High Pressure Alarm Comp 1(0=HP1 normal, 1=HP1 alarm)
LP2	lp2_2st_1	BV:6	discrete in	10023	binary in	23	nvoLp2Alm	SNVT_Count_inc 9	✓	Network status of UPM Low Pressure Alarm Comp 2(0=LP2 normal, 1=LP2 alarm)
HP2	hp2_2st_1	BV:7	discrete in	10020	binary in	20	nvoHp2Alm	SNVT_Count_inc 9	✓	Network status of UPM High Pressure Alarm Comp 2 (0=HP2 normal, 1=HP2 alarm)
FRE	frz_2st_1	BV:8	discrete in	10018	binary in	18	nvoFrzAlm	SNVT_Count_inc 9	✓	Network status of UPM Freeze Alarm (0=FRZ normal, 1=FRZ alarm)
CON	con_2st_1	BV:9	discrete in	10012	binary in	12	nvoConAlm	SNVT_Count_inc 9	✓	Network status of UPM Condensate Alarm (0=CON normal, 1=CON alarm)
BRN	brn_2st_1	BV:10	discrete in	10009	binary in	9	nvoBrnAlm	SNVT_Count_inc 9	✓	Network status of UPM Brownout Alarm (0=BRN normal, 1=BRN alarm)
Comp1 Output Cmd	cmp1_cmd_1	BV:11	discrete in	10003	binary in	3	nvoCmp1Cmd	SNVT_Count_inc 9	✓	Network status of compressor 1 output command (0=Comp1 Off, 1=Comp1 On)
Comp2 Output Cmd	cmp2_cmd_1	BV:12	discrete in	10004	binary in	4	nvoCmp2Cmd	SNVT_Count_inc 9	✓	Network status of compressor 2 output command (0=Comp2 Off, 1=Comp2 On)
Compressor Stages	cmp_stgs_1	AV:14	float value	40003	data float	2	nvoCmpStgs	SNVT_Count 8	✓	Network status indicating number of compressor stages in unit

FHP BOSCH - Water to Air, Zone/ Rmote / BAS sensor options
Network Integration Points List
Version 3.03

Point Name	BACnet		Modbus		N2 Open		LonWorks		Read Only	Description
	Name	Type:ID	Object Type	Register	Type	Object ID	Name	SNVT		
Comp1 Runtime Rst	cmp1_rntm_rst_1	BV:13	discrete out	2	binary out	2	nviCmp1RntmRst	SNVT_Count_inc 9		Network parameter to reset Comp 1 runtime. Momentary On/Off required.
Comp2 Runtime Rst	cmp2_rntm_rst_1	BV:14	discrete out	3	binary out	3	nviCmp2RntmRst	SNVT_Count_inc 9		Network parameter to reset Comp 2 runtime. Momentary On/Off required.
Rev Valve Output Cmd	rev_vlv_cmd_1	BV:15	discrete in	10008	binary in	8	nvoRevVlvCmd	SNVT_Count_inc 9	✓	Network status of reversing valve output command (1=vlv energized, 0=vlv de-energized)
Rev Valve Action	rev_vlv_act_1	BV:16	discrete out	7	binary out	7	nvoRevVlvAct	SNVT_Count_inc 9		Network parameter for reversing valve action (1=Cooling is active, 0=Heating is active)
Fan Output Cmd	fan_cmd_1	BV:17	discrete in	10005	binary in	5	nvoFanCmd	SNVT_Count_inc 9	✓	Network status of fan output command (1=fan On, 0=fan Off)
Continous Fan	cont_fan_1	BV:18	discrete out	4	binary out	4	nviFanCont	SNVT_Count_inc 9		Network parameter to run fan continuously during Occ Mode (On=runs in occupied,Off=cycle with compressors)
Reset Fan Rntm	fan_rntm_rst_1	BV:19	discrete out	6	binary out	6	nviRstFanRntm	SNVT_Count_inc 9		Network parameter to reset fan runtime. Momentary On/Off required.
Aux Heat Output Cmd	aux_htg_cmd_1	BV:20	discrete in	10002	binary in	2	nvoAuxHtgCmd	SNVT_Count_inc 9	✓	Network status of auxilliary heat output command (1=heat On, 2=heat Off_
Occupancy Status	occ_status_1	BV:21	discrete in	10007	binary in	7	nvoOccSta	SNVT_Count_inc 9	✓	Network status of occupancy command (1=occupied, 0=unoccupied)
NSB Status	nsb_status_1	BV:22	discrete in	10006	binary in	6	nvoNsbSta	SNVT_Count_inc 9	✓	Network status of night setback command (1=NSB enabled , 2=NSB disabled)
Control Source	ctrl_source_1	AV:15	float value	40005	data float	3	nviCtrlSrce	SNVT_Count_inc 9		Network parameter setting control source for occupancy (0=Digital Input 1, 1=Keypad Schedule, 2=BAS Occupancy Command, 3=Factory Use, 4=Manual On-Continuous)
Loop Enabled	loop_enabled_1	BV:23	discrete out	5	binary out	5	nviLoopEna	SNVT_Count_inc 9		Network parameter indicating loop status (On=Allow Heat/Cool, Off=Disable Heat/Cool)
System Status	sys_status_1	AV:16	float value	40033	data float	17	nvoSysSta	SNVT_Count 8	✓	General System Status: 0=Unoccupied, 1=Occupied, 2=Fan Only, 3=Heating, 4=Cooling, 5=Transition to Cool, 6=Transition to Heat, 7=Manual Cool, 8=Manual Heat
Alarm Status	alm_status_1	BV:24	discrete in	10001	binary in	1	nvoAlmSta	SNVT_Count_inc 9	✓	Network Status indicating alarm condition in unit (see "Current Alarm" for more information)
Current Alarm	current_alarm_1	AV:17	float value	40011	data float	6	nvoCurAlm	SNVT_Count 8	✓	Network status indicating alarm condition in unit (0=No Alarm, 1-7=UPM Fault Code, 20=Output Overridden via Keypad, 30=Sensor Failure, 40=Zone Temp Alarm, 50=Discharge Air Temp Alarm, 60=Filter Alarm, 70=Leaving Water Temp Alarm)
Control Sensor Selector	ctrl_sen_sel_1	AV:18	float value	40009	data float	5	nviCtrlSenSel	SNVT_Count_inc 9		Network parameter setting for selecting controlling sensor (0=RS Sensor 1, 1=Remote Sensor, 2=BAS Sensor
BAS Control Sensor Value	bas_sen_val_1	AV:19	float value	40001	data float	1	nviBasSenVal	SNVT_temp_p 105		Network parameter to define remote temperature sensor input value
UPM Reset	upm_rst_1	BV:25	discrete out	8	binary out	8	nviUpmRst	SNVT_Count_inc 9		UPM Reset. Momentary. Would rather the BAS toggle the OCC signal or setpoints to reset. This is here to use on an as needed basis

Figure 16 - Typical water to air integration points list

Water to Water Operation

General Description

The Heat Pump Factory mounted I/O Zone 560 or 583 DDC Controllers are factory configured with the Water to Water application program and factory installed in the unit to be job site configurable to run.

The Unit will operate in a 100% stand-alone control mode or connect to a Building Automation System (BAS) using open protocols BACnet® (ARCNET and MS/TP), Modbus RTU, N2 or LonWorks® (additional network interface board required for LonWorks® option).

The point mapping to these protocols can be pre-set, so that the protocol and baud rates desired can be easily field-selected and commissioned without the need for any additional downloads or technical assistance. The Controller also supports communications to intelligent RS Room sensors and BACview keypad/display panels.

Inputs

- Load (entering) water temperature sensor
- Leaving (source) water temperature sensor
- Changeover temperature sensor
- Cooling/Heating mode select (DI Mode)
- UPM Alarm codes (7 safety shutdown alarms)
- Unit Occupancy Enable (DI Enable)

Outputs

- Pump control
- Reversing Valve
- Compressor Stage 1
- Compressor Stage 2
- Aux Output

Control & Status Parameters and Alarms

Status and Control

- BACview occupancy schedule
- System control: Schedule, Manual ON, BAS or DI Enable
- Load (entering) water temperature
- Leaving (source) water temperature
- Changeover temperature (optional)
- Cooling/Heating control status
- Cooling/Heating percentage (0-100%)
- Heating/Cooling mode manual control (optional)
- Reversing valve control
- Pump control (optional)
- Comp 1 control
- Comp 2 control (Comp 2 Circuit)

Alarms

- Load (entering) water temperature high/low limits
- Leaving (source) water temperature high/low limits
- Sensors failure alarm
- Comp 1 Runtime trip
- Comp 2 Runtime trip (Comp 2 Circuit)
- Freeze Stat sensor UPM alarm (optional)
- Low pressure sensor UPM alarm
- High pressure sensor UPM alarm
- Low pressure sensor UPM alarm (Comp 2 Circuit)
- High pressure sensor UPM alarm (Comp 2 Circuit)
- Condensate overflow UPM alarm
- High/low voltage UPM alarm

Sequence of Operation

Run Conditions:

The unit will run according to a user definable time schedule, dry contact (physical digital input number 1), manual ON command from BACview control interface or via third party front end start command (BV software point). When commanded to run the unit will operate in the following modes:

Occupied Mode: The unit will maintain

- A 54°F (12°C) adj. Cooling setpoint
- A 105°F (40 °C) adj. Heating setpoint

Unoccupied Mode (night setback): The unit will maintain

- A 74°F (12°C) adj. Cooling setpoint.
- A 85°F (30°C) adj. Heating setpoint.

The values above can be changed by the commissioning agent by using the BACview or via the BAS.

Auto Changeover Mode

When operating on Changeover mode the unit will automatically change from heat to cool and vice versa, by using the *Changeover Setpoint* and the *Changeover Deadband*.

These points can be changed by the commissioning agent, the factory defaults are 65°F and 3°F (18°C and 2°C) respectively, the units will enter in cooling or heating mode according to the following:

Auto Cool:

- Chageover Temperature > Changeover Setpoint + Change over dead Band

Auto Heat:

- Chageover Temperature < Changeover Setpoint - Change over dead Band

When using the changeover feature the system will require an air temperature sensor (10KΩ @ 77°F (25°C) Thermistor) typically located in the controlled zone.

Digital Input Mode

When operating on Digital Input mode the unit will change from heat to cool and by using the state of the digital input (IN6) on controller as follows:

- Off = Heat
- On = Cool

This feature is typically used when a remote switch is needed but no BAS is available, if a BAS is available FHP recommends operating the unit by using the integration points as they will provide additional and valuable information the end user.

BAS Mode

When operating on BAS mode the unit will change from heat to cool and by writing to the *Control Mode* integration point.

Please refer to the integration points list for additional information on how to make the unit part of the BAS.

Lead - Lag Compressor operation

NOTE: This feature is only available on two stage systems.

The unit will alternate the compressors by using Lead Lag control algorithm; the rotation method is user definable and can be set during the commissioning process as follows:

- Monthly
- Daily
- Time of Day

By default the unit will change its lead compressor if the one acting as lead fails.

The unit will provide the following compressor alarms:

Compressor 1 Runtime: If the compressor runtime hours are greater than 8760.
Compressor 2 Runtime: If the compressor runtime hours are greater than 8760.

Pump Control (optional)

The unit can control a pump by using Digital Output 1 (DO1) on controller; this feature can be enable or disabled, set to run with compressors or continuously during the commissioning process.

- If commissioned to run continuously the pump will run when the unit is in occupied mode.
- If commissioned to cycle with compressors the pump will be commanded on only when the compressors are running.

The factory default is enabled to cycle with compressors.
The unit will provide the following compressor alarms:

Pump Runtime Alarm: If the pump runtime hours are greater than 8760.

Load Water (Entering) Temperature:

The controller will monitor the entering load water temperature which is located at entering side of coil.

Alarms will be provided as follows:

Load High Temp: If the water temperature at the entering load side is greater than the cooling setpoint plus a user definable amount (adj.), the factory default for this amount is 10°F.

Load Low Temp: If the water temperature at the entering load side is less than the heating setpoint minus a user definable amount (adj.) the factory default for this amount is 10°F.

Load Sensor Failure: If the load water sensor is outside of normal operating limits, typically produced by a wiring failure between the sensor and the controller.

Source Water (Leaving) Temperature:

The controller will monitor the leaving water temperature on the source which is located on the source leaving side of coil.

Alarms will be provided as follows:

Leaving High Temp: If the leaving water temperature is greater than 135°F

Leaving Low Temp: If the leaving water is less than 35°F.

Leaving Sensor Failure: If leaving water sensor is outside of normal operating limits, typically produced by a wiring failure between the sensor and the controller

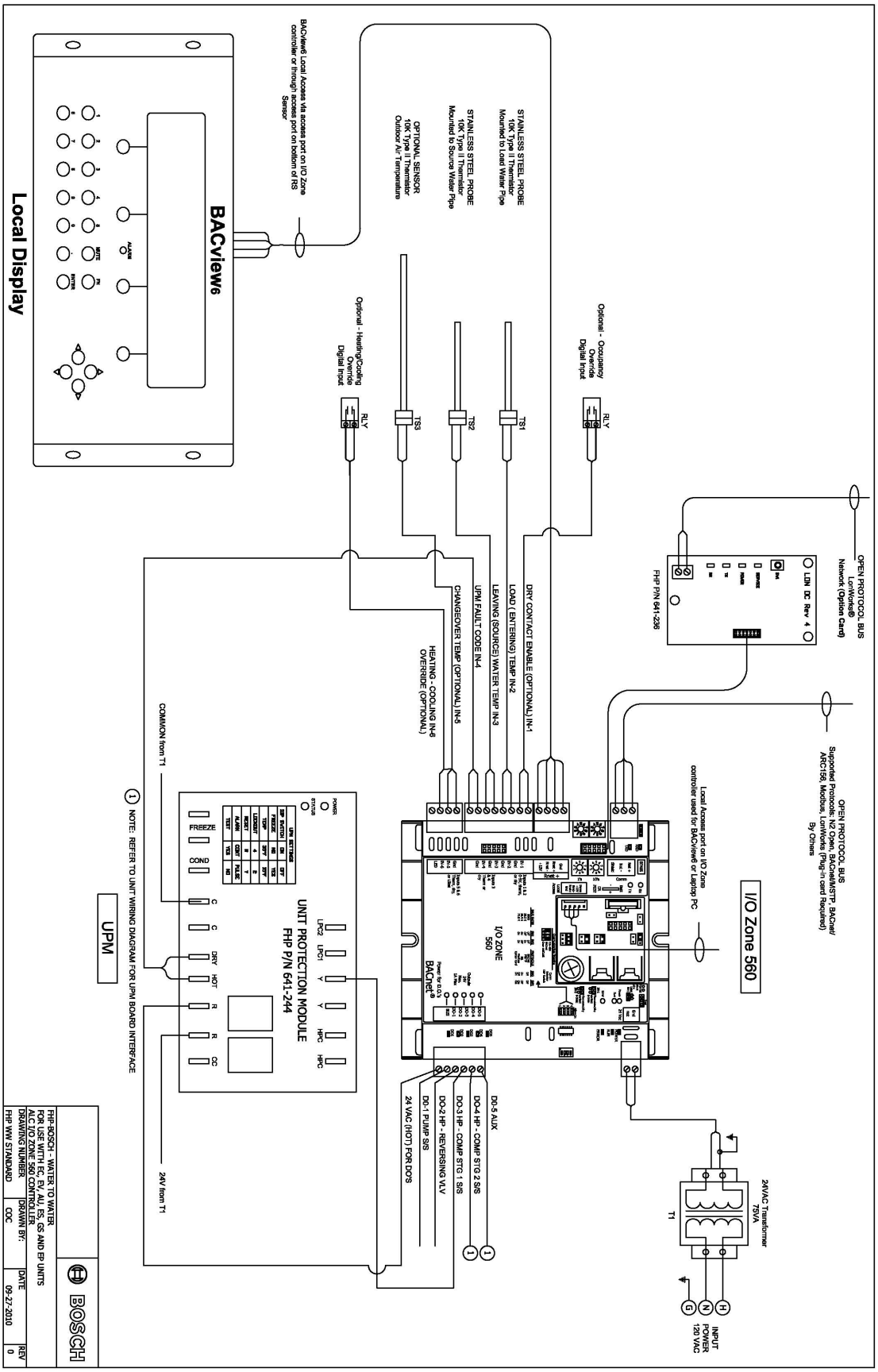

Local Display
BACview6
BACview6 Local Access via access port on I/O Zone controller or through access port on bottom of RS Sensor
STAINLESS STEEL PROBE 10K Type II Thermistor Mounted to Load Water Pipe
STAINLESS STEEL PROBE 10K Type II Thermistor Mounted to Source Water Pipe
OPTIONAL SENSOR 10K Type II Thermistor Outdoor Air Temperature
Optional - Heating/Cooling Override Digital Input
Optional - Occupancy Override Digital Input
RLY
TS3
TS2
TS1
OPEN PROTOCOL BUS LonWorks® Network (Option Card)
FHP P/N 641-236
LON DC Rev 4
DRY CONTACT ENABLE (OPTIONAL) IN-1
LOAD (ENTERING) TEMP IN-2
LEAVING (SOURCE) WATER TEMP IN-3
UPM FAULT CODE IN-4
CHANGEOVER TEMP (OPTIONAL) IN-5
HEATING - COOLING IN-6 OVERRIDE (OPTIONAL)
OPEN PROTOCOL BUS Supported Protocols: N2Open, BACnet/MSTP, BACnet/ARCNET, Modbus, LonWorks (Plug-in card Required) By Others
Local Access port on I/O Zone controller used for BACview6 or Laptop PC
I/O Zone 560
I/O ZONE 560
BACnet
DO-5 AUX
DO-4 HP - COMP STG 2 S/S
DO-3 HP - COMP STG 1 S/S
DO-2 HP - REVERSING VLV
DO-1 PUMP S/S
24 VAC (HOT) FOR DO'S
24VAC Transformer 75VA
T1
INPUT POWER 120 VAC
NOTE: REFER TO UNIT WIRING DIAGRAM FOR UPM BOARD INTERFACE
COMMON from T1
24V from T1
UPM
UNIT PROTECTION MODULE FHP P/N 641-244
FREEZE
COND
LPC2
LPC1
HPC
C
DRV
HOT
R
CC
FHP-BOSCH - WATER TO WATER
FOR USE WITH EC, EV, AU, ES, GS AND EP UNITS
ALL I/O ZONE 560 CONTROLLER
DRAWING NUMBER
FHP WW STANDARD
DRAWN BY:
CDC
DATE
09-27-2010
REV
0
BOSCH

Figure 17 - Typical water to water applications – Water to Water Standard

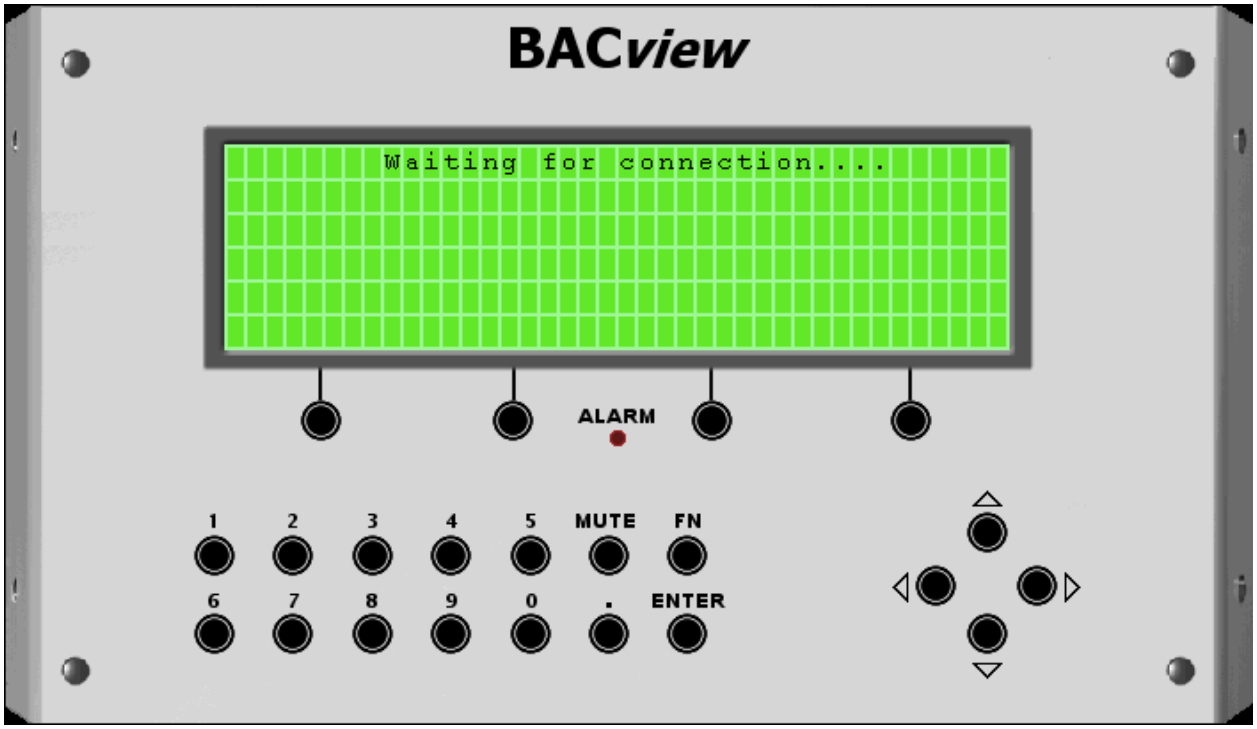
Point Name	BACnet		Modbus		N2 Open		LonWorks		Read Only	Description
	Name	Type:ID	Object Type	Register	Type	Object ID	Name	SNVT		
BV Unit Enable (BAS)	enable_bas_1	BV:1	discrete out	1	binary out	1	nviEnaBas	SNVT_Count_inc 9		Network parameter to define occupancy (0=BAS control Off, 1=BAS control On)
Unocc Htg Setpoint	unocc_htg_stpt_1	AV:1	float value	40037	data float	19	nviUnOccHtgSpt	SNVT_temp_p 105		Network parameter to define unoccupied heating setpoint
Occ Htg Setpoint	occ_htg_stpt_1	AV:2	float value	40029	data float	15	nviOccHtgSpt	SNVT_temp_p 105		Network parameter to define occupied heating setpoint
Unocc Clg Setpoint	unocc_clg_stpt_1	AV:3	float value	40035	data float	18	nviUnOccClgSpt	SNVT_temp_p 105		Network parameter to define unoccupied cooling setpoint
Occ Clg Setpoint	occ_clg_stpt_1	AV:4	float value	40027	data float	14	nviOccClgSpt	SNVT_temp_p 105		Network parameter to define occupied cooling setpoint
Setpoint Differential	stpt_diff_1	AV:5	float value	40031	data float	16	nviStptDiff	SNVT_temp_p 105		Network parameter to define setpoint differential (range=1 to 3 deg F)
Changeover Setpoint	xovr_stpt_1	AV:6	float value	40003	data float	2	nviXovrStpt	SNVT_temp_p 105		Network parameter to define changeover setpoint (range=65 to 85 deg F)
Changeover Deadband	xovr_dbnd_1	AV:7	float value	40001	data float	1	nviXovrDdnd	SNVT_temp_p 105		Network parameter to define changeover deadband (range=1 to 6 deg F)
Effect Changeover Temp	eff_xovr_tmp_1	AV:8	float value	40017	data float	9	nvoEffXovrTmp	SNVT_temp_p 105	✓	Network status of changeover temperature
Effect Leaving Wtr Temp	eff_lvg_wtr_tmp_1	AV:9	float value	40023	data float	12	nvoEffLvgTmp	SNVT_temp_p 105	✓	Network status of leaving water temperature
Effect Load Temp	eff_load_tmp_1	AV:10	float value	40025	data float	13	nvoEffLoadTmp	SNVT_temp_p 105	✓	Network status of load temperature
Effect Cooling Setpoint	eff_clg_stpt_1	AV:11	float value	40019	data float	10	nvoEffClgSpt	SNVT_temp_p 105	✓	Network status of effective cooling setpoint
Effect Heating Setpoint	eff_htg_stpt_1	AV:12	float value	40021	data float	11	nvoEffHtgSpt	SNVT_temp_p 105	✓	Network status of effective heating setpoint
LP1	lp1_2st_1	BV:2	discrete in	10019	binary in	19	nvoLp1Alm	SNVT_Count_inc 9	✓	Network status of UPM Low Pressure Alarm Comp 1(0=LP1 normal, 1=LP1 alarm)
HP1	hp1_2st_1	BV:3	discrete in	10013	binary in	13	nvoHp1Alm	SNVT_Count_inc 9	✓	Network status of UPM High Pressure Alarm Comp 1(0=HP1 normal, 1=HP1 alarm)
LP2	lp2_2st_1	BV:4	discrete in	10020	binary in	20	nvoLp2Alm	SNVT_Count_inc 9	✓	Network status of UPM Low Pressure Alarm Comp 2(0=LP2 normal, 1=LP2 alarm)
HP2	hp2_2st_1	BV:5	discrete in	10014	binary in	14	nvoHp2Alm	SNVT_Count_inc 9	✓	Network status of UPM High Pressure Alarm Comp 2(0=HP2 normal, 1=HP2 alarm)
FRE	frz_2st_1	BV:6	discrete in	10012	binary in	12	nvoFrzAlm	SNVT_Count_inc 9	✓	Network status of UPM Freeze Alarm (0=FRZ normal, 1=FRZ alarm)
CON	con_2st_1	BV:7	discrete in	10006	binary in	6	nvoConAlm	SNVT_Count_inc 9	✓	Network status of UPM Condensate Alarm (0=CON normal, 1=CON alarm)
BRN	brn_2st_1	BV:8	discrete in	10008	binary in	8	nvoBrnAlm	SNVT_Count_inc 9	✓	Network status of UPM Brownout Alarm (0=BRN normal, 1=BRN alarm)
Comp1 Output Cmd	cmp1_cmd_1	BV:9	discrete in	10002	binary in	2	nvoCmp1Cmd	SNVT_Count_inc 9	✓	Network status of compressor 1 output command (0=Comp1 Off, 1=Comp1 On)
Comp2 Output Cmd	cmp2_cmd_1	BV:10	discrete in	10003	binary in	3	nvoCmp2Cmd	SNVT_Count_inc 9	✓	Network status of compressor 2 output command (0=Comp2 Off, 1=Comp2 On)

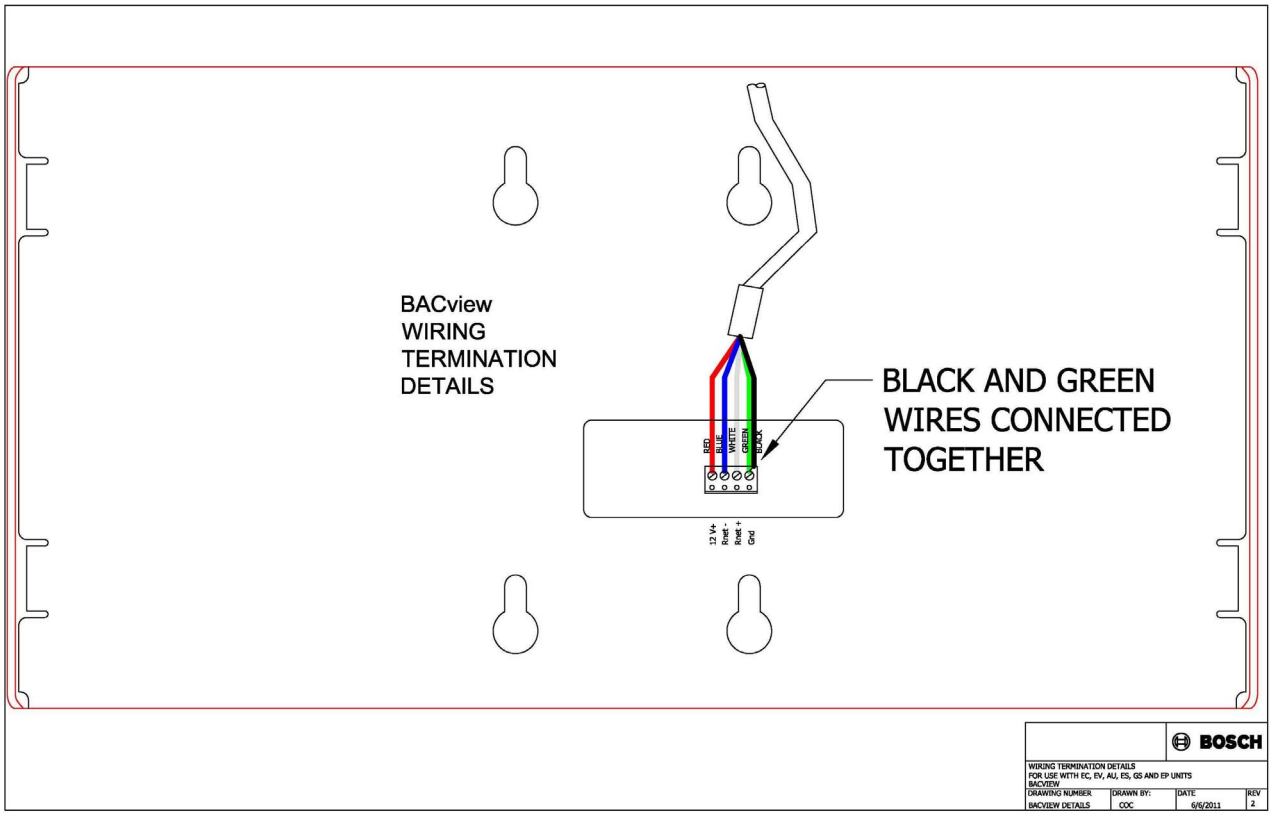
FHP - Water to Water
Network Integration Points List
Version 2.01

Point Name	BACnet		Modbus		N2 Open		LonWorks		Read Only	Description
	Name	Type:ID	Object Type	Register	Type	Object ID	Name	SNVT		
Comp1 State	cmp1_state_1	AV:13	float value	40005	data float	3	nvoCmp1Sta	SNVT_Count 8	✓	Network status indicating state of compressor 1 (1-Lead, 2=Lag, 3=Fault)
Comp2 State	cmp2_state_1	AV:14	float value	40007	data float	4	nv0Cmp2Sta	SNVT_Count 8	✓	Network status indicating state of compressor 2 (1-Lead, 2=Lag, 3=Fault)
Compressor Stages	cmp_stgs_1	AV:15	float value	40009	data float	5	nvoCmpStgs	SNVT_Count 8	✓	Network status indicating number of compressor stages in unit
Comp1 Runtime Rst	cmp1_rntm_rst_1	BV:11	discrete out	2	binary out	2	nviCmp1RtmRst	SNVT_Count_inc 9		Network parameter to reset Comp 1 runtime. Momentary On/Off required.
Comp2 Runtime Rst	cmp2_rntm_rst_1	BV:12	discrete out	3	binary out	3	nviCmp2RtmRst	SNVT_Count_inc 9		Network parameter to reset Comp 2 runtime. Momentary On/Off required.
Rev Valve Output Cmd	rev_vlv_cmd_1	BV:13	discrete in	10007	binary in	7	nvoRevVlvCmd	SNVT_Count_inc 9	✓	Network status of reversing valve output command (1=vlv energized, 0=vlv de-energized)
Rev Valve Action	rev_vlv_action_1	BV:14	discrete out	6	binary out	6	nvoRevVlvAct	SNVT_Count_inc 9	✓	Network status of reversing valve action (1=Cooling is active, 0=Heating is active)
Pump Output Cmd	pump_cmd_1	BV:15	discrete in	10006	binary in	6	nvoPmpCmd	SNVT_Count_inc 9	✓	Network status of pump output command (1=pump On, 0=pump Off)
Continous Pump	cont_pump_1	BV:16	discrete out	4	binary out	4	nviContPmp	SNVT_Count_inc 9		Network parameter to run pump(s) continuously during Occ Mode (On=runs in occupied,Off=cycle with compressors)
Reset Pump Rntm	pump_rntm_rst_1	BV:17	discrete out	5	binary out	5	nviRstFanRntm	SNVT_Count_inc 9		Network parameter to reset pump runtime. Momentary On/Off required.
Occupancy Status	occ_status_1	BV:18	discrete in	10005	binary in	5	nvoOccSta	SNVT_Count_inc 9	✓	Network status of occupancy command (1=occupied, 0=unoccupied)
NSB Status	nsb_status_1	BV:19	discrete in	10004	binary in	4	nvoNsbSta	SNVT_Count_inc 9	✓	Network status of night setback command (0=NSB disabled , 1=NSB enabled)
Control Source	ctrl_source_1	AV:16	float value	40013	data float	7	nviCtrlSrce	SNVT_Count_inc 9		Network parameter setting control source for occupancy (0=Digital Input 1, 1=Keypad Schedule, 2=BAS Occupancy Command, 3=Factory Use, 4=Manual On-Continuous)
Control Mode	ctrl_mode_1	AV:17	float value	40011	data float	6	nviCtrlMode	SNVT_Count_inc 9		Network parameter to define unit mode selection (0=Off, 1=Heat, 2=Cool, 3=Auto, 4=Digital Input)
System Mode	sys_mode_1	AV:18	float value	40033	data float	17	nvoSysMode	SNVT_Count 8	✓	Network status indicating system operating mode (1=Neutral, 2=Heating, 3=Cooling)
Alarm Status	alrm_status_1	BV:20	discrete in	10001	binary in	1	nvoAlmSta	SNVT_Count_inc 9	✓	Network Status indicating alarm condition in unit (see "Current Alarm" for more information)
Current Alarm	current_alm_1	AV:19	float value	40015	data float	8	nvoCurAlm	SNVT_Count 8	✓	Network status indicating alarm condition in unit (0=No Alarm, 1-7=UPM Fault Code, 20=Output Overridden via Keypad, 30=Sensor Failure, 40= Leaving Water Temperature , 50= Load Temperature, 60=Pump Run time, Compressors Runtime
UPM Reset	upm_rst_1	BV:21	discrete out	7	binary out	7	nviUpmRst	SNVT_Count_inc 9		UPM Reset. Momentary. Would rather the BAS toggle the OCC signal or setpoints to reset.This is here to use on an as needed basis

Figure 18 - Typical water to water integration points list

BACview Termination Detail



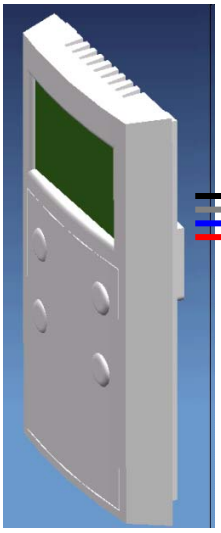


RS-Sensor Termination Detail

The RS Sensor is remotely mounted and installed (up to 500ft) in the zone it is recommended to use shielded cable (20AWG conductors) if installing RS-sensor only.

If BACview is installed remotely using the same cable is recommended to use shielded cable (18AWG conductors).

Room Sensor

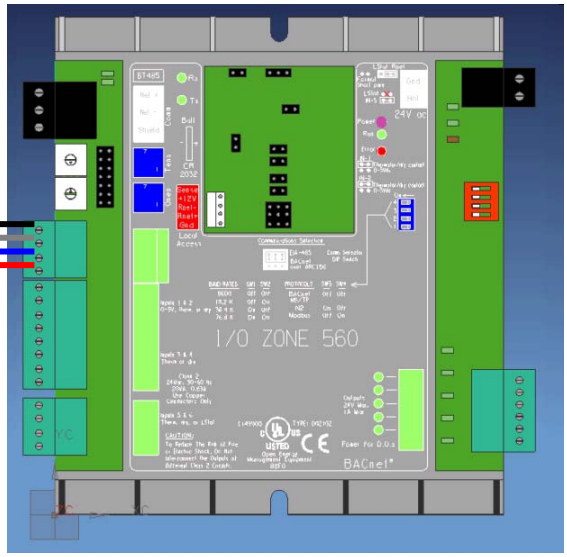


Rnet port termination:

Black = Ground
White = R-net +
Blue = R-net -
Red =12VDC

Field installed wiring four conductor shielded cable

DDC - Unit



The RS-Pro Sensor interface

The RS-Pro sensor factory part number 641-230 is a combination keypad/display unit that attaches to a control module to let you view and change temperature and set points values and the controller's components status, the following features only apply to the software version covered on this manual.

ICONS

Alarm Bell	Indicates Alarm Condition (see INFO button for more information)
Cooling	Indicates unit enabled in cooling mode
Heating	Indicates unit enabled in heating mode
Occupied	Indicates unit in occupied mode
Unoccupied	Indicates unit in unoccupied mode
Fan	Indicates fan output energized

BUTTONS

ANUAL ON	Places unit into occupied mode. Allows for incremental increase in override time (60min, 120min, 180 min , 4hrs, 5hrs, 6hrs, 0 min) each time button is pressed
WARMER	Allows for increase in zone temperature setpoint (+1° to per push to a maximum of +5° or as configured at DDC through BAC view6) from default setpoint value
COOLER	Allows for decrease in zone temperature setpoint (-1° to per push to a maximum of -5° or as configured at DDC through BAC view6) from default setpoint value.

IMPORTANT:	By Pressing the Info button on the sensor the user can see the following typical data:

INFO

PRESS 1 – Displays **occupancy override time** (in minutes)

PRESS 2 – Displays **actual heating setpoint** (in degrees F)

PRESS 3 – Displays **actual cooling setpoint** (in degrees F)

PRESS 4 – [1] - Displays **discharge air temperature** (in degrees F)

PRESS 5 – [2] - Displays **leaving water temperature** (in degrees F)

PRESS 6 – [3] - Displays **active alarm code**

0	Indicates NO ALARM
1	Indicates active HP alarm comp 1
2	Indicates active LP alarm comp 1
3	Indicates active HP alarm comp 2
4	Indicates active LP alarm comp 2
5	Indicates active freezestat alarm
6	Indicates active condensate alarm
7	Indicates brownout condition
20	Indicates input/out in MANUAL lock position. It is not in AUTO
30	Indicates RS zone, discharge or leaving water temperature sensor failure
40	Indicates high or low RS zone temperature condition
50	Indicates high or low discharge air temperature condition
60	Indicates filter or compressor service alarm
70	Indicates high or low leaving water temperature condition

PRESS 7 – [1] – Displays status of compressor 1 output (ON/OF)

PRESS 8 – [2] – Displays status of compressor 2 output (ON/OF)

PRESS 9 – [3] – Displays status of auxiliary heat output (ON/OF)

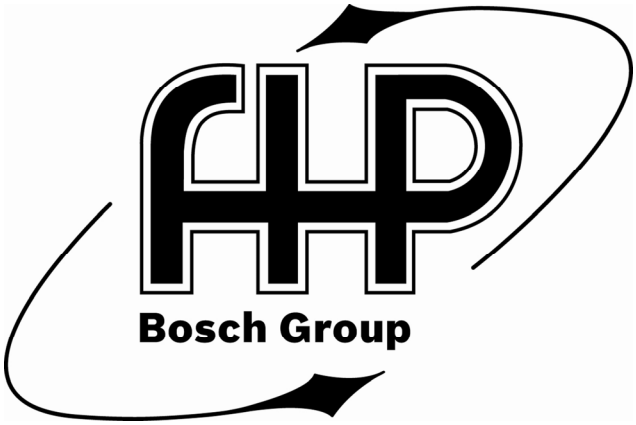
PRESS 10 – Displays fan status (fan icon=fan ON), unit condition (AU=auto)

PRESS 11 – Displays unit mode (AU=auto)

PRESS 12 – Goes back to default screen display

NOTES

NOTES



601 N.W. 65th Court, Ft. Lauderdale, FL 33309
Phone: 954-776-5471 Fax: 954-776-5529
www.fhp-mfg.com